

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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THE METAL MARKET DURING THE YEAR 1870.

After a prolonged period of inactivity, at times amounting to stagnation, the natural result of the speculative mania, which culminated in the panic of the spring of 1866, the Metal Market bade fair to assume a more healthy character upon the opening of the year 1870 than it had worn for the five preceding years. Prices had very generally fallen to such a figure that there did not appear much room for any further depreciation—the money market presented unusual facilities for financing—and, as in past experience, periods of inactivity, the fruit of over-trading, had been succeeded by a time of more than ordinary activity, so it was reasonable to anticipate that the time had arrived when a turn in the lane extending its unvarying course through the tedious length of five long years had at last been attained. The fair promises of the early weeks of January seemed only to be strengthened and confirmed through the month of February, and our fear then was that with the return of vitality there might be a return of that rash and undesirable speculation and over-trading which had already wrought such irreparable mischief; but before the close of February the horizon began to show signs of gathering storms, and we wrote with the sort of prescience which comes upon the mind of a seer, that the time had arrived when the general character of business, with some exceptions, declined. March was a dull month. April showed some improvement, more particularly in the iron trade, and we took occasion to remind "those whom it should concern" that the sudden influx of orders might possibly prove of but a temporary character, and that it would be well to exercise caution in entering upon engagements or enlarging plant, which in the event of a cessation of orders would involve loss and great inconvenience. In the month of May public attention was drawn to the report of the attempt upon the life of the Emperor Napoleon. Since then other events of so much greater significance and magnitude having occurred, the fact of the attempted assassination, in order to the establishment of a Republic, has been almost, if not entirely, forgotten; but at the time of the occurrence it exercised an influence upon the public mind, not so much because of the effect produced, as showing a condition of unsettlement which might at any moment break out in one direction or another, and materially disturb, perhaps totally disorganise, our business relations with our continental neighbours. That these anticipations were not groundless, succeeding events have abundantly proved. Whatever the exciting cause might have been, the fact is now patent to all that the hopeful prospects with which the year opened, and which might have been expected to have developed with the departure of the winter and the dawn of spring and summer, only became more overclouded as the season advanced, so that in our last report in May we described the markets generally as presenting "a languid appearance," and as manufacture was still going on without a corresponding demand, and stocks were consequently on the increase, we could only anticipate lower prices. The chief exceptions to this state of things was presented in the position of the tin and iron markets, which from the beginning of the year, up to the middle of the year, continued to advance, almost without a drawback; but as our present observations refer rather to the condition of the markets generally, than to the position of any one particular metal, we defer enlarging upon these exceptional instances until we come to consider each metal under its own heading.

It was difficult for sellers, so far back as the month of June, to realise that the existing dullness was more than temporary. They still clung to the hope that it would pass off, and although in almost all branches there was great quietness, and in some very marked depression, yet, though quotations were maintained, actual transactions were few; buyers were not courted, and sellers preferred biding their time to pressing the market; and so the month of June slipped by. Our reports may be summarised in some such words as these:—June, first week, "Business very limited;" second, "Sellers still indisposed to lower quotations;" third, "No improvement." July, first week, Market quiet;" second, "Nothing fresh to report." With the third week in July came the first authenticated report of the prospect of war, and as the public realised, first what might possibly be, then what might probably be, and lastly what had finally taken place—that blood had positively been shed before Metz, and that war in all its stern realities had broken out—embarrassment was succeeded by suspense, prices became merely nominal as a rule, various opinions were urged regarding the probable continuance of the strife, and the general feeling was that Napoleon meant what he said, "that the war would be long and severe," and the result has proved so. Men of business became impressed with the assurance that so long as war should rage trade generally would continue very much at a standstill. Thus little effort was made to do business; buyers and sellers seemed to agree that their mutual interest was best served by quietly looking on, hoping, at times almost against hope, upon humanitarian grounds, as well as from the point of view occupied by them as business men, that the war would ere long be brought to a close. Thus we drifted through the months of July and August. In September the Bank rate was reduced to 3½ per cent., but this reduction did not exercise the slightest influence in imparting vitality to the metal market. No business of any importance was transacted. At this period of the year we began to observe a marked decrease in the exports of metals, more especially in the direction of India and China, and we augured therefrom that were production at home brought within narrow limits—that is, within the limits of the legitimate demands of trade for the home and foreign markets—the time would of necessity arrive, sooner or later, when existing stocks would be consumed, and such a demand spring up as to enable manufacturers and sellers to ask and to obtain prices which should prove fairly remunerative. The large capitalists and producers in this country were under no compulsion to press sales on the one hand, nor to continue manufacturing on such a scale as to cause an undesirable accumulation of stocks; while smaller capitalists, having their works more within compass, would experience, perhaps, less difficulty than their more wealthy neighbours in contracting their operations within restricted bounds. Towards the middle of the month of September

the Bank directors published a further reduction in the Bank rate to 3 per cent., and in the last week of the same month we observed an improvement in the home trade. Orders for home requirements were freely given out, but of themselves were insufficient to keep the mills in full operation. Foreign orders were reduced to a minimum, and consequently as those manufacturers who had shipped on consignment had by this time learnt that the balance of loss upon making for stock was less than that which was incurred upon parcels shipped on consignment, the falling off of exports became more apparent than ever, and we were strengthened in our opinion, that with the continuance of steady consumption and short deliveries there must eventually be a demand—and we still look for the expected improvement. It probably will not take place until after the conclusion of the war, and even then, it may be, rather of a slow and gradual character than be marked by any sudden revulsion.

The month of October passed without affording any encouragement; and if the weekly articles in the Journal were of a discouraging tendency, it was only because they portrayed correctly the state of the markets, and the opinions of those who were among the best calculated to form a correct judgment upon the probable future of the metal trade. November showed no improvement as regards shipments, but the home trade remaining firm preserved the steadiness of the market, and reports reached us from more sources than one that short shipments were beginning to tell upon the foreign markets. This is, consequently, the direction in which we must look mainly for any real and permanent improvement. It was not to be expected that the month of December should differ materially from its predecessors with respect to the character of the transactions exhibited in the metal market. Merchants are, for the most part, engaged in ascertaining the result of their past year's labours, and in laying their plans for future operations; so that, unless some very advantageous transaction presents itself, they do not, as a rule, lay themselves out for fresh business during the last month of the year. In entering upon a new year, we are tempted to moralise upon the uncertainty of the fulfilment of hopes which appeared to be based upon sound premises. The prospects of the metal trade at the commencement of the year 1870 were brighter than they had been for some years previously, but in time they became overclouded; but events have occurred during the year which for magnitude and importance have been enough to throw out of gear not only business in connection with metals, but to a greater or less degree to disorganise the commerce of the country. What the year now dawning upon us may be, bringing in its train it would be hard to say. Much, very much, must depend upon the cessation of hostilities, and the establishment of a permanent peace—the arts of war and peace cannot flourish simultaneously. How far we are nearer the end of the war than we were six months ago is a problem beyond the limits of discussion in a metal article; but of this we are assured, that short shipments to our foreign markets must eventually create a demand, and that although the home trade has been fairly sustained during the past year, yet on the whole it has lacked that vitality which characterises busy times. There is good reason to believe that as soon as the disturbing causes shall have ceased to operate, there will be a steady and permanent return to the normal conditions of commerce, which are accompanied by moderate activity, and which end in successful results.

COPPER.—At the beginning of 1870 Chili bars were firm, at 66½, 10s. to 67½, and so, with but little variation, they continued to be quoted throughout the months of January and February. In writing a *résumé* for the year upon this metal, we would more particularly direct attention to Chili copper, as this description may be said to be the pulse which now indicates, to a great extent, the condition of the copper market generally. Should there be any decided alteration in the position of Chili bars, all other descriptions of copper would in degree be affected thereby. In the month of March a series of letters were published in the *Mining Journal* under the signature of "Nosiris," which pointed out the self-evident truism, though some are slow to acknowledge it, that no permanent improvement could be looked for in the position of copper so long as "supplies exceeded demand." During this month smelters put down the price of manufactured 2½, making sheet copper 75½ per ton, with an allowance for cash of 2½ per cent., instead of 3 per cent., as before, but this reduction did not influence buyers. The fortnightly charters from Chili kept coming forward with unfailing regularity, and buyers found no inducement, either from a falling off in imports, or from advices from their correspondents abroad, or from the nature of exchange, especially between India, China, and this country, to extend their operations beyond the narrowest compass. In the beginning of April we find Chili bars still quoted 66½, and towards the middle and end of this month an effort of a spasmodic and ephemeral character was made to sustain the market, but, like many such previous efforts, it only served to prove how utterly unavailing it is to act in direct opposition to the universally acknowledged law, that when the supply of a commodity is greater than the demand the price of the same must inevitably fall. Under the influence of speculation, quotations were forced up to 67½, 10s., 68½, before the close of April, and reverted to the old figure, 66½, in the early part of May. The impression forced itself upon us very strongly at this period of the year, and each day's experience only tended to confirm the same, that fresh evidence of weakness was becoming more and more apparent, and we were assured of the ultimate downward tendency of the market. Speculation might, of course, arise again, as it had done repeatedly before, and for a time alter the face of the market, but only for a time. That prices must eventually fall we again and again reiterated. The foregoing remarks were fully confirmed by the course which the market took shortly afterwards. We were so thoroughly convinced in our views that prices must assume a declining tendency for some time, that at the end of the month—in the Journal of May 20—we gave statistical proof of the period of low prices upon which we were about to enter.

In June and July there was a temporary reaction, but in August Chili bars fell to 62½, and we observed that "it was questionable if sellers had to rely exclusively upon English buyers, whether any large quantity could be placed above 60½." Doubtless this exceedingly depressed condition of the market was owing in some measure to the effect of the war. All trade with the Continent had pretty nearly come to an end, and the reported failure of some French smelting houses tended still further towards depression. During September there were some slight fluctuations; and in October Chili bars touched the lowest point reached throughout the whole course of the year—60½, 10s. Manufactured copper sold about this time for 70½ per ton, being just about half the price it was sold at in 1857, in which year business was done at 140½ per ton, or 15d. per lb. Throughout the three or four years previous to this date it maintained an almost uniform rate of about 130½ per ton, or 14d. per lb. During November the market rallied, so that quotations for Chili bars advanced gradually up to 63½, but the business transacted was of the most restricted character, and so it must remain as long as the existing combination of circumstances concurs in keeping copper in a more unsatisfactory condition than that of any other metal bought and sold in the London market. This overproduction of foreign descriptions of copper, to which we have so frequently alluded, though not during this year carried to the same excess as last, must be brought within bounds, or else the relative values of raw and manufactured must undergo a revision; and inasmuch as, owing to the slackness in the demand and unfavourable exchange with the principal foreign markets, buyers are not likely to advance their offers for manufactured copper, the price for raw, as compared with manufactured, should show a greater difference than it now does to enable the smelters to work at a reasonable profit. There can be no doubt that sooner or later this must right itself, but not until the current of business has reverted to its original channel, which we fear will not take place while the public mind is dis-

turbed by hourly telegrams from the seat of war, and fresh political complications seem cropping up to retard the possibilities of effecting the much-desired peace. In closing our report upon this metal, it is, at all events, satisfactory to be able to state that a better feeling is beginning to be manifested, which has already resulted in smelters having advanced their quotations 3½ per ton. Chili bars, according to brand, 64½ to 65½; ores, 12½d. per unit; to melt, 7½d.; to smelt, 7½d.; Indian Braziliery, 4 ft. by 4 ft., 73½ to 74½. Yellow metal sheathing advanced to 7d., less 5 per cent.; sheet, 4 ft. by 4 ft., 6½d. to 6½d.

IRON.—The market for this metal in most of its varieties opened with firmness at the beginning of the year 1870. Staffordshire descriptions were quiet, but there was considerable activity in the Welsh districts and in the North of England, the rail mills being especially busy. As we have already remarked, the prospects of the metal trade generally were a year ago, on the whole, good, but the prospects of the iron trade were at that time exceptionally good. The existing American demand was good, and the prospective demand was still better. It was thought that Russia would enter the lists for rails in considerable quantities later on in the season, and India and the colonies, together with home orders, furnish their quota towards affording employment to the mills. Scotch pigs were firm at 57s. 3d., and there was a steady demand for Swedish iron. There was little change to record during January. Scotch pigs declined towards the end of the month to 55s. 4½d. Welsh bars were held firmly at 71 to 71½, and Staffordshire continued very quiet. February was marked by the strike among some of the ironworkers. Mr. Hughes was appointed arbitrator, and under his auspices arrangements were entered into, which, on the whole, have worked successfully throughout the year in preventing or else in settling disputes as they arose. The Russian and Chilian railway loans came out this month, and the ironmasters in Wales began to make preparations for large orders. Scotch pigs, after dropping to 54s., looked firmer at the close of the month. In March the question of the American tariff, and the failure of some of the leading firms in Cracow, appeared as disturbing elements, and for a time the market was injuriously affected. Scotch pigs fell to 54s., but speedily recovered to 54s. 6d. Towards the end of March the indents from the East began to fall off, but as the manufacturers were to a great extent independent of their Indian connection, the iron trade which existed from orders coming in from other quarters, the Welsh trade and that of the North of England continued to improve. Indeed, in the beginning of April reports reached us from the North that the work could not be turned out fast enough. Scotch pigs rose to 56s. 6d., from which price they made a rapid spring towards the end of the month to 59s. A general impression existed during the early part of May that the markets being firm higher prices might be expected, and this impression would have been strengthened had it not been for the fluctuations in Scotch pigs, which, though well known to be a very speculative article, and consequently liable to sudden movements, yet showed an unsteadiness which might possibly not be accounted for altogether by speculation. In the second week in May Scotch pigs fell to 56s. 10½d., but in the last week Russian and American orders came in, and continental enquiries increased, so that Welsh bars and Staffordshire iron both improved, and a large business was transacted in Scotch pigs at about 58s. to 59s. The month of June found the ironmasters hard at work in fulfilment of extensive orders for Russia, America, France, and Germany. General attention was directed to Scotch pigs, and heavy transactions took place at an advance of about 1s. per ton. Welsh bars rose to 71½, 6d., 71½, 10s., f.o.b., London. Up to June 20 this activity prevailed. The mills in the North were as busy as those in Wales, and some of the Staffordshire manufacturers, desirous of sharing in the gain which the existing demand seemed to promise, made arrangements for the introduction into their mills of machinery suitable for turning out railway material. The highest figure Scotch pigs at this period attained was 60s. 6d. It was not until July that we received authentic intelligence of the certainty of war; but towards the close of June continental affairs began to assume a threatening aspect, and as Scotch pigs may be said to indicate the pulse of the iron market, being more sensitive than any other description of iron, it was not, therefore, a matter of surprise that so soon as warlike rumours got into circulation they should drop to 58s. 6d. at the close of June, and when those rumours were confirmed in July that there should be a further sudden drop to 51s. The lowest point they touched was in the beginning of August, when they were quoted 49s. 9d., from which point they recovered about the middle of the month to 51s. 6d., and have stood with but little variation at about this figure ever since. From the month of August until the end of the year there has been little to chronicle. Those masters who in the early part of the year filled their books continued fully engaged for a longer period than those who were less fortunate. With the outbreak of war came a cessation of fresh orders, from the continental and other foreign markets, while things continued anything but lively in India and the colonies, so that whatever support the iron trade has received during the latter part of the year has resulted in the main from home demand, which, has, on the whole, been good, and which has materially helped to support prices. Although matters wear a somewhat dull aspect at present, the ironmasters are not of opinion that the trade can continue for long in its present condition, and doubtless with restoration to peace would come a great change in the position of almost every description of iron. The falling off in shipments, especially to India, has been so great that a demand must spring up in time, and this demand is only delayed because of the uncertainty which the present overhang of the market creates. Lower prices are looked for, and any change that may occur we may fairly argue will be for the better.

LEAD.—In January last the lead market was steady, and lead, in common with metals generally, promised well. Prices were moderate, WB being quoted 19½, 12s. 6d., and LB 19½, 2s. 6d., and other brands from 2s. 6d. to 5s. under. WB has usually ruled 1½ to 1½, 10s. above LB, but latterly, with a view of encouraging the sale of the former brands, the price of it has been brought nearer to that of LB. Pig lead continued steady throughout January and the early part of February, but as the month wore on we began to notice quietness, which became more marked towards the close of the month. Transactions at full rates became increasingly limited, and as through the month of March there was no improvement in demand, prices tended in buyers' favour, and good soft pigs were to be bought at 18½, 10s. At this quotation there were rather sellers than buyers. April found lead still neglected. Sellers were anxious to do business, and within limits were ready to make considerable concessions, but the reports from foreign markets of the sales of English pig, more particularly the advices from China, were not of such a character as to encourage merchants to buy even at the lowest quotations. In May a fair business resulted from sellers submitting to still further concessions, and in the beginning of June good soft pigs were quoted at 18½, and towards the close of the month the prospects of war began to put a different complexion upon the market. There were buyers at an advance of 2s. 6d., and in July sellers declined quoting a price. When the war positively broke out the prevailing impression was that, however it might ultimately issue, the French would carry the battle field far into German soil, and that thus the supplies of lead from the Continent would be interrupted. Upon these grounds quotations at once advanced, and large sales were concluded at improving prices up to 21 per ton. Events have occurred since which have completely falsified the calculations that were based upon the foregoing assumption, but at the time of which we are writing there certainly appeared to exist good grounds for the supposition which not only took possession of the Emperor and the whole French nation, but which induced some calm onlookers among our English merchants to forecast their plans with reference to the aspect of future events, which seemed to point to the interruption of supplies from Germany during the continuance of the war. The tide of battle, however, soon turned, and the base of operations was speedily transferred from Prussian to French territory, and since the opening of the campaign until now that which was originally the attacking force has been compelled to act on the defensive, and has been steadily driven back further and further away from the boundary line. The supplies of continental lead have, consequently, come forward with but little irregularity, and so soon as the course which the war was likely to take was observed the price of lead fluctuated for awhile, and then rapidly receded to quotations which were current previous to the outbreak of war, at which point, with but little variation, it has stood ever since. At times a fair business has been concluded upon the basis of about 18½ per ton for good soft pig, and the market has, on the whole, been firm, but quiet.

SPELTER.—The price of Silesian in the month of January, 1870, was 18½, 15s. 6d. and English hard spelter was quoted 15½, 5s. In February there was a marked improvement, owing mainly to the na-

vigation being closed; and the price for Silesian rose first to 19s. in the beginning of the month, and then towards its close, in consequence of the long-continued and almost uninterrupted frost during the month, to 19s. 7d. In March lower prices were accepted in prospect of supplies coming forward with the opening of the navigation. During April Silesian was very much neglected. Sellers quoted 20s. Hard spelter was in better demand. Throughout May little was done in Silesian, but a fair business was transacted in hard at 14s. 15s. to 15s. In June sellers held firmly, not knowing how the prospect of war might affect the market. Great unwillingness was manifested on part of holders in July to make any concession, but finding in August that the fortune of war had transferred the scene of action far away from the Silesian mines, and that the production and shipment to England of foreign spelter was not interfered with, several sales were effected at a considerable reduction. Hard spelter continued throughout the month in fair demand at 15s. September passed off with very little doing in either foreign or English. Those whose stocks stood at about 18s., and the latter was quoted about 14s. 19s. In October quotations dropped during the month to 17s. 8s. for Silesian, and 14s. for hard. In November a decided improvement was perceptible; several parcels changed hands at gradually improving rates until at the close 17s. 15s. to 18s. was once again the quotation—at which price it has stood steady since, and closes firm. The principal of the stock of foreign is held for higher prices, which is not at all improbable, especially should the winter continue long and severe, may be obtained.

TIN.—In the beginning of the year 1869, just two years ago, Straits tin stood at about 113s. per ton. During the course of that year the tin market was repeatedly the scene of violent speculation, and towards the close of 1869 operators had forced up the price of Straits to 140s. per ton. As might have been anticipated, a reaction set in, which was as violent and more rapid in its course than the upward movement had been—so that in January, 1870, there were sellers of Straits at 104s. per ton. A panic had taken possession of the market, and it was impossible to predict to what lengths it might go. Towards the close of January sales were effected, though the market was weak, and low prices had to be accepted. It was about this period that a series of articles appeared in the *Mining Journal*, pointing out what the public had apparently lost sight of during the panic—that the stocks of tin were held by very strong houses, that these stocks were not in excess of requirements, and that in accordance with all the laws which should influence men's minds in the conduct of commercial affairs these were solid grounds for the expectation, which amounted to a certainty, that tin could not for any prolonged period continue to occupy the position into which at the beginning of 1870 it had been unnaturally forced, but that there must be a rebound. We ventured to predict in our last issue for the month of January that Straits tin, then quoted at 109s., would before the year ran out have attained 120s. The conviction that forced itself upon our minds at the time of penning this article was that our prophecy would be accomplished in the course of a few weeks; but, as our previous articles have been so long in the hands of the public, and as the opinions differed from the conclusions at which we had arrived, we preferred, in deference to their views, so to modify the expression of our own as not to commit ourselves to too early a date for so important an advance as 11s. per ton, so we fixed the time somewhat indefinitely as "during the present year." Let the sequel show how far the event justified these assertions.

Early in February we characterised the rise that had then taken place in the value of tin as but the beginning of active enquiry and importations. As the month advanced we pointed out to those who were still holding back being doubtful of the course the market was about to take, that there was still time to retrieve, in measure, the ground which had been lost, and we repeated our assurance that Straits tin would attain 120s. before the expiration of the year. The predicted advance had been so rapid and steady that towards the close of February the price we had named (120s.) was that at which Straits tin was quoted. It stood at this price for some time, but about the middle of March sales became irregular, and until the end of the month quotations continued at 119s. to 120s. The Dutch sale took place in the beginning of April, and the result thereof was to send up Straits to 122s. Later on in the month a further advance was established, until 123s. to 124s. was quoted, but the strength of the market was not apparent, and we ventured again to express an opinion that the zenith had been reached, and that there was a probability that prices might recede. At the close of the month business was reported at 121s. May opened with a firm market, but still the price appeared too high for any operations beyond the supply which might be required for immediate use. A little business was transacted during the month, and prices fluctuated from 121s. to 124s. 10s., a few small lots for consumption changing hands at the higher figure.

In June the market gave way; very little real business was effected, and at the end of the month the quotation for Straits was 121s. In July the news from the Continent caused further depreciation; in fact, for a time the market broke up altogether; the price had fallen to nominally 115s. for Straits, with nothing doing. In August there was a rumour that the Dutch Government intended abandoning the higher prices for tin, but it appeared to be without foundation; nevertheless, some firmness was imparted to quotations, and a recovery of 8s. to 10s. per ton was realised. September opened with a quiet market; Straits tin was quoted at 126s.; later on 118s. was accepted for a small parcel of Banca tin, ex sale, and Straits was easier, nominally at 125s. and 124s. In October tidings of the Dutch sale were received. Straits tin had fallen to 123s., and although the sale had gone off at a better price than had been expected, yet the market expected no higher price for tin, but it had not transpired into whose hands the bulk of the tin offered at the sale had fallen; but before the end of October buyers were satisfied that any expectation they might have had of lower prices was not likely to be realised, and the market at once advanced, through the continual purchase of small lots, to 128s. During November the price varied somewhat, and towards the middle of the month there were sellers of Straits at 125s., after which the market showed some signs of recovery from the drooping position it had previously assumed, the improvement arising chiefly in consequence of the higher prices quoted for tin. This state of things continued until the opening of December, when a further gradual improvement was observed, although sales for arrival of Straits continued unchanged at 125s. The strength of the market increased throughout the month, closing firm at 132s. 10s. to 133s. for foreign, with a corresponding advance in English, and good prospects for the future.

THE SCOTCH IRON TRADE.

PIG IRON WORKS IN SCOTLAND—FURNACES.

Proprietors.	Works.	In blast.	Out.	Total.
Wm. Baird and Co.	Gartsherrie	13	—	13
ditto	Eglinton	7	1	8
ditto	Blaik	2	3	5
ditto	Lugar	4	—	4
ditto	Muirkirk	2	1	3
ditto	Portland	4	2	6
Merry and Cunningham	Gartgarnock	6	3	9
ditto	Ardre	6	—	6
ditto	Carbroe	6	—	6
Coltness Iron Company	Coltness	12	—	12
Dalmellington Iron Company	Dalmellington	7	1	8
Monkland Iron and Steel Co.	Monkland	9	—	9
Robert Addie and Sons	Langloan	7	1	8
Wilson and Co.	Summerlee	7	1	8
James Dunlop and Co.	Quarrier	5	1	6
Colin Dunlop and Co.	Govan	2	—	2
William Dixon	Calder	6	2	8
ditto	Shotts	3	1	4
Shotts Iron Company	Castlhill	2	1	3
ditto	Wishaw	2	1	3
Wishaw Iron Company	Kinnel	3	1	4
George Wilson and Co.	Lochmyle	3	2	5
Lochmyle Iron Company	Lumphinnans	2	—	2
A. Christie and Co.	Carron	3	1	4
Carron Iron Company	Almond	2	1	3
James Russell and Son	Gladsmuir	1	—	1
C. and A. Christie		—	—	—
Total		126	32	158

ECONOMY IN FUEL.—A number of gentlemen interested in steam shipping assembled on board the *Argos*, built by Messrs. T. R. Oswald and Co., to witness the trial of an Amalgamating Fuel Heating Apparatus, which has been patented by Messrs. Oswald and Swaddle, of Sunderland, by which the patentees have succeeded in affecting a considerable saving in the consumption of fuel—say, 15 per cent. The advantages offered by this apparatus are briefly as follows—that a portion of exhaust steam is condensed by the feed water being injected amongst it on its passage from the cylinder to the surface condenser, thereby reducing the volume of steam to be condensed, likewise returning that portion of heat which it has absorbed, the boiler thus economising fuel. Connected with this two things are well known to all marine engineers—1. That a much larger quantity of water is required in a surface condenser than in a jet one to obtain the same result, and if so obtained, the condensed steam, as feed water is generally very low in temperature, and if amalgamated with the sea water, to make up for leakage, waste of steam, &c., blowing off occasionally, which is quite necessary, so that the water in the boiler may be charged and prevented from having an injurious effect on the iron, which will lower the temperature of steam still further.—2. With respect to consumption of fuel, the advantages many surface condensing engines have over the jet is not so much as owners are liable to expect; this is owing to the great difference of temperature in the feed water with which the two kinds of engines supply their boilers. But if the feed water be made equal in temperature, the advantages of the surface condensing engine are very great, because boilers in good working order need not more than one-tenth of the fuel which is required in the surface condensing type to that of the jet one, and a reduced amount of feed water is required, and less fuel to keep the engine supplied with steam. The object accomplished by the amalgamating apparatus is that the amalgamated water requisite to condense the feed water, as it goes into the boiler at a high temperature (say from 150 to 200 or 210 degrees), assisting the surface condenser at the same time, hence its economical principle. Among the gentlemen present who observed the following practical engineers, who expressed themselves fully satisfied with the result:—Messrs. Foster, Sunderland; Mr. Blair, Hull; Mr. Tomlinson, Cardiff; Mr. Evans, Liverpool; Mr. Garrison, New York, U.S.—*Sunderland Times*.

LONDON GENERAL OMNIBUS COMPANY.—The traffic receipts for the week ending Dec. 25 were £7041.

Original Correspondence.

MINING NOTES FROM NORTHAMPTONSHIRE.

Since the first discovery of ironstone in Northamptonshire, some 17 or 18 years ago, there has not been anything like the activity in connection with it as there is at the present time. For this state of things the landowners on whose property the ore is being raised are in a great measure indebted to Mr. W. BUTLIN, the "father of the iron trade in Northamptonshire," who was the first to melt the ore, and who has spared neither time nor expense in bringing under public notice the real worth of the ironstone. For several years it was looked upon as of very little value, and ironmakers in Staffordshire and other districts spoke of it most disparagingly. Now, however, its worth is recognised in nearly all our leading iron making localities, and the county, from the rapidly increasing demand for the ore, promises to take a much higher position than it at present enjoys as a producer of stone of a quality much superior to that obtained in Yorkshire or in Lincolnshire. From 416,765 tons in 1867 it has increased to at least 540,000 tons in 1869. Just now, too, fresh ground is being broken in several directions, and there is scarcely any limit to the quantity that can be raised. The principal field of production is Wellingborough, where more than 200,000 tons a year is being raised. In that locality, as in most others in the county, the ore varies a good deal as regards its richness in iron, in some places giving from 35 to 45 per cent., and in one large tract of land, belonging to Messrs. Butlin and Co., recent analysis gives an average of rather more than 46 per cent. of iron. Besides giving such a large percentage, the stone of Northamptonshire is of a highly silicious character, and when mixed with certain other ores—such, for instance, as the calcareous minerals of Lincolnshire—would produce a far superior description of iron than could be made by the latter alone. Indeed, it is only by laboratory experiments that the advantages of an admixture of different descriptions of ironstone can be ascertained. A knowledge of analytical chemistry, in fact, is necessary to the ironmaster, as by it alone he can tell how to combine certain qualities of ore with a view to producing iron of a specified description. At Wellingborough Mr. Butlin has fitted up a laboratory, presided over by a gentleman from the School of Mines, and by experiments already made it appears that the Northamptonshire stone is comparatively free from sulphur and phosphorus, and consequently well adapted for converting into steel, the actual average of iron being 40 per cent.

At Woodford, near Thrapstone, a great deal of ore has been raised. It is of good quality, and has been sunk to instead of being taken, as in most other parts of the county, from near the surface. Recently the works were stopped for a short time, owing to the death of the owner, General Arbuthnot. It is, however, understood that the business will be carried on by Mr. Hussey Arbuthnot, who has hitherto had the management of it. In the same locality the Isip Iron Ore Company have been raising a fair quality of stone. The country around, from Market Harborough by way of Kettering and up to Northampton itself, is a highly mineralised one, so that the iron trade, it may be said, is as yet only in its infancy.

Finedon, two miles from Wellingborough, is the head quarters of the Glendon Iron Company, and a considerable tonnage of stone is raised in the district, part of which has been used by the furnaces of the company, whilst the remainder has been sent into Derbyshire, for mixing with the local ores there. Between Wellingborough and Northampton ironstone is being worked, but not to anything like the extent it is at the works to the north. In the county town itself, however, some very fine stone has been raised, some of it having been found whilst sinking foundations, and so quarried out. It is also likely that on the new line between Bedford and Northampton ironstone will be found, seeing that it permeates nearly all parts of the county, north and south.

On the other side of the town of Northampton, at a place called Duston, a considerable tonnage of ore has been raised, on land which we believe formerly belonged to Lady Palmerston, and leased by Mr. G. Pell. At Blisworth and Gayton, near to the Blisworth station, of the London and North-Western Railway, an average of more than 2000 tons weekly of stone has been obtained, and for which there is a ready market locally and in Staffordshire. Some idea of the business which has been done in the county may be gathered from the following returns of iron ore raised during the years 1868 and 1869, and which, although taken from Mr. Hunt's Statistics, we are in a position to say are much below the mark:—

	1868.	1869.
Blisworth	46,513 Tons	61,117 Tons
Weedon	41,519	51,007
Wellingborough	9,906	6,886
Heyford, &c.	91,328	—
Mesborough	26,686	—
Glendon	50,281	—
Finedon	11,935	80,000
Duston	—	59,859
Gayton	9,779	21,328
East End Wellingborough	100,429	100,000
Brixworth	6,977	9,545
Woodford	35,858	65,440
Dean and Chapter Land	17,926	—
Islip, Thrapstone	—	25,000
Cogenhoe	—	26,000
Total	449,116 Tons	540,259 Tons

There are various other parts of the county, more particularly in the neighbourhood of Rugby, and up to and around Daventry, where ironstone is expected to be found, and, in fact, is known to exist. As there is now every probability of a line of railway being constructed from Northampton by way of Heyford to Daventry, it is to be hoped that the inhabitants of the last-named place will take steps to ascertain whether in the grounds around that interesting place—of our visit to which we have a pleasing and lively recollection—there are not vast and valuable mineral deposits. The subject is one well worthy the attention of those gentlemen who have passed the mayoral chair, and who occasionally discuss in that great pile of buildings, the *Sheaf* (mighty in coaching days), the wants and requirements of the town, which, owing to there being no railway to it, has long been in a state of decadence, but now stands some chance of reviving. We may also state that at Peterborough and around it ironstone has been found, and no doubt before long will be worked. From the very extensive contracts which have been recently entered into, we have no hesitation in stating that the quantity raised in 1871 will be one-half more than in 1869; and it only wants one more element, coal—and to which we shall hereafter allude—to make the county of Northampton a second Cleveland, with the advantage of having a far superior quality of ironstone.

The production of pig-iron at the various works in the county has kept pace with the increased tonnage of ore raised, and advanced from 35,584 tons in 1868 to 41,500 tons in 1869. During the present year the output has been considerably larger, as in addition to the furnaces which have been kept constantly going at Glendon and Ithlingborough, Mr. Plevins, of Heyford, near Weedon, has the three furnaces still in full work. The one at Stowe, however, is quiet. Messrs. Butlin have four at work, two at Wellingborough, and two near to the Midland station. Experiments are being made at the latter by tapping them about half-way up, and taking off the gases, which are put through the ordeal of various chemical tests. The rolling-mills which were commenced rather more than a couple of years since to Messrs. Butlin's furnaces have made no progress whatever during the year. Part of the machinery and most of the buildings, including the stacks, have been completed, and thus after a large outlay the place continues cold, cheerless, and useless. The case, however, is different at the works on the opposite side of the railway, belonging to Mr. Joseph Williamson, the owner of a large foundry at Chilvers Coton, near Nuneaton. At his Wellingborough establishment he is turning out large quantities of railway chairs, having been amongst the first to test and appreciate the quality of the Northamptonshire pig-iron. Mr. Williamson is a Manchester man, with all the energy that distinguishes the Lancashire manufacturer, and in the early part of his career was the friend and associate of Mr. Fairbairn. During nine years he made no less than 475 railway bridges, and in the last five years had consumed up-

wards of 17,000 tons of pig-iron. A few men such as Mr. Williamson would now be invaluable to Northampton in working up the pig produced, by the introduction of rolling and other mills, and thus aid in developing the vast accumulation of mineral wealth which abounds in nearly all parts of the county.

The very important question as to whether coal is likely to be found in Northamptonshire at a workable depth has cropped up again during the past week or two, by letters in some of the papers. Much has been written upon the subject from time to time, and from different points of view. One member of the Geological Society, a schoolmaster at a village called Dallington, near Northampton, considers it worse than folly to expect to find coal in the county, whilst Mr. T. Parton, F.G.S., of Willenhall, who is well known as a writer in connection with mineralogy, gives it as his opinion that the geological structure of that part of the county lying between Northamptonshire and the Warwickshire coal field rather "favoured the idea of the existence of coal underneath the oolitic formations of the former district," but probably at a very great depth. The opinion of Mr. Parton is worthy of every consideration, and we believe will to some extent be borne out by the sinkings made many years since at Kingsthorpe, near Northampton, when the oolites and lias to the Bunter red sandstone were gone through, the depth being about 300 yards. By boring through the permian group there is every reason to believe that the carboniferous formation would be reached. With regard to the depth at which coal can be worked, it may be stated that at Rose Bridge Colliery, near Wigan, the depth to the bottom seam which has been reached is 813 yards. Many eminent mining engineers who have visited the shaft at Kingsthorpe, and examined the section of the strata gone through, are of opinion that the coal would be found at no great distance from the bottom of the shaft already sunk. In a matter of such vast importance to the inhabitants of Northampton—and, indeed, to those throughout the entire county—the wonder is that steps have not been taken before now to bring the question to a practical issue by the only method that would be satisfactory—by boring. We are glad to find, however, that such a solution is likely to take place before long, and we heartily wish those who may engage in it will be successful.

COLLIERIES IN NORTH DURHAM, THEIR WORKINGS AND MACHINERY—No. II.

SPRINGWELL COLLIERY.—The royalty attached to this colliery is 2500 acres. The present coal pit has been 44 years in operation, and is situated near the Pontop and Jarrow Railway, the private line of the mining company, Messrs. John Bowes and Partners, Springwell being one of their collieries, detached from the Marley Hill group. The rise coal in the property had been raised at Mount Moor Pits prior to the commencement of Springwell Pit, but an extensive field of coal is still available for the latter, both to the rise and dip. The Springwell Pit is 14 ft. in diameter, 130 fms. in depth to the Hutton seam, and divided by wood brattice into two parts, the larger division (24 ft.) for coal work, is also the downcast; the other division (44 ft.) is appropriated as the upcast from the underground engine and boilers in the Hutton seam, and causes ventilation for the Maudlin seam workings. The principal ventilator, however, is the Quarry upcast pit, about 1 mile west from Springwell, 104 fathoms in depth; this, with a furnace, serves to ventilate the Low Main and Hutton seam workings. In sinking the Springwell Pit, the High Main, Maudlin, Low Main, and Hutton seams were passed through; the three latter are at present being worked; the High Main is yet unworked at this pit, though of fair quality. Immediately above the High Main seam a bed of sandstone, 18 yards in thickness, is found; this is known in the district as the Grindstone Post; in sinking through it large feeders of water were met with, which was subsequently dammed back by cast-iron tubing; this tubing has now become too weak, from corrosion, to withstand the pressure of water behind it; the tubing is, therefore, relieved by tapping it, and withdrawing the water in 5-in. pipes to the bottom of the pit, conveying it from thence in pipes laid to the rise in the Hutton seam to the pump-shaft at Mount Moor, about one mile distant from Springwell Pit. The Mount Moor pumping-engine has been in operation at this pit upwards of 60 years; it is a single-acting condensing beam-engine, of 42-inch cylinder, stroke from 5 to 6 feet; the beam is of wood, with arched ends, which is connected to the piston-rod and pump-rod respectively by three-linked chains. This engine goes 10 hours per day, at the rate of nine strokes per minute, and raises water in two lifts in the pit, from the depth of 101 fms.; the lower lift is 51 fms., 24-in. bucket; the upper lift is 50 fms., 9-in. bucket; the stroke in each is equal to the stroke in the cylinder. At the top of the pump-shaft a winding-engine is erected, by which men may be raised at any time, there being underground communication between this and Springwell Pit. Two plain boilers, 14 feet by 8 feet, supply the two engines with steam, at 14 lbs. pressure. The Springwell Pit winding-engine has a 57-in. cylinder, 7-ft. stroke, wrought-iron levers, double-beat valves, air-pump, and condenser; 18-feet cylindrical drum, for round wire-ropes; the house is built of ashlar stone, also the intermediate support for the drum and fly-wheel. Three plain boilers supply the engine with steam, at 15 lbs. pressure; this engine feeds the boilers. The boilers are wheel-flued, hand-fired, and uncovered; they were made at the works of Palmer's Shipbuilding and Iron Company. The engine is from the works of Messrs. T. Murray and Co., 1867. About 600 tons of coal is raised daily by this engine, in two-decked cages, four 8-owt. tubs in each cage, from the depth of 130 fms. (the Hutton seam level), which is produced from this and two other seams above it. The pulleys are 15 ft. in diameter. The winding-engine also raises water five hours each night, by tanks placed in the lower deck of the cages. The old winding-engine—superseped by that described—has a 32-in. cylinder, 5-ft. stroke, vibrating beam, cylindrical drum, and now works a coal elevator. The old pumping-engine now drives circular-saws, and supplies the pond with surface drainage, by a pump worked by chain; this is a 24-inch beam-engine, 5 feet stroke; one plain boiler supplies both engines, at 30 lbs. pressure. The headstead, screens, and pulley-frames are all of wood; a stock of coal may be kept in a building made of stone to the extent of 2000 tons.

The Hutton seam has been extensively worked at Springwell during 44 years, the coal remaining being principally in pillars on the deep side of the pit. The Low Main and Maudlin seams are comparatively little worked. The produce of the Hutton seam is drawn from the dip by an engine bank of most extensive range, and a high-pressure beam-engine, placed about 100 yards from the pit, erected 30 years ago. It has 26-in. cylinder, 4-ft. stroke, fly-wheel, two pinion and three spur-wheels, in ratio of 1 to 2; two 7-ft. drums, each on its own shaft and moved by slide carriages; one pinion and one spur wheel, on a separate shaft, work, by means of wire-rope, an 8-inch bucket-pump, 3-ft. stroke, placed 600 yards down the bank, having a counterbalance weight to pull the rope back at each stroke; the pump is in operation two hours each night. Three plain boilers, placed near the engine, supply it with steam at 35 lbs. pressure; two are 18 by 6 ft., one 36 by 5 ft.; these have a continuous feed, from 3-in. pipes, connected with the tubing, and regulated by cocks; the pressure due to the depth of the pipes is 150 lbs. per inch. The engine bank has been nearly two miles in length; this is now reduced to 3000 yards, as it is being worked back. In order to facilitate the hauling on this great length, the bank is worked in two separate lifts by the engine, with a drum and rope for each lift; the empty tubs run inwards by gravity; a set of laden tubs is being drawn up one lift while an empty set is being run down on the other. The engine bank proceeds in an east direction from the engine, 1200 yards, at which point the ropes are changed. At 600 yards from the engine the Low Main coal is dropped down by a staple at the side of the bank, 10 fms. in depth; 25 tubs are drawn at once from the staple, and 20 tubs at once from the changing place; this is done by one drum and 3-in. wire-rope. The engine bank next proceeds N. 53 W. from the changing place 1800 yards further; this part of the bank and a northward, branching off near the extremity, are worked by another drum and 24-in. steel wire-rope. The ruling gradient is 3 in. per yard for the first 1½ mile; below this, owing to a downthrow fault of 7 fms., the dip is 6 in. per yard, and towards the extremity the dip is from 1 to 1½ in. per yard, and is just sufficient to be worked by gravity with a light rope; 20 tubs are run at once on the lower lift.

The Hutton seam measures 4½ ft. in thickness at the pit; in the workings beyond the extremity of the engine-bank the section is—

Blue metal, moderate roof.	6 ft. 3 in.
Channel	3
Good coal	0 3 ft. 3 in.
Fire-clay, inferior.	

The dip is east about 1½ in. per yard here. The pillars are made 22 by 20 yards, and are worked off in 5-yard lifts from each end. In working back it is a rule to take the coal away entirely, and to withdraw all timber, which is found to moderate the pressure on places in process of being worked. The Stephenson lamps are used exclusively for lighting this mine. In the operations of working the Hutton seam every precaution is taken to attain security by establishing proper rules for the guidance of men and overlookers; science is also brought into play in ridding the mine of its dangerous product—carburetted hydrogen gas. From the principal north and south branches of the engine-bank the bords have been usually driven to the dip or eastward; by this method ventilation was rendered easy and natural, whereas with bords driven to the rise ventilation was so difficult that safety could not be maintained with the ordinary quantity of air at command. When the pillars are worked back one-half of the panel is taken eastward, the other half westward. These north and south branches are defended by a barrier on each side, in both of which, that on the dip side particularly, a gas drift is formed, which receives the natural drainage of gas from the goaf below it; through this drift a current of air is flowing, which carries off the gas rising by its levity to this highest part of the goaf. The workings being arranged on this principle, the effect is there is no flow of gas from the lower parts of the goaf, but a regular drainage into the gas drifts above, increasing with any considerable fall in atmospheric pressure. The barriers referred to are worked away subsequently with the general homeward working of the pillars. The workmen employed in this seam are all old hands, who have been brought up on the place; they understand perfectly the changes in the conditions of the roof stone, and the indications of the safety-lamp; this is an advantage which new collieries employing in many cases untrained and inexperienced men do not possess. It is to measures such as these, having large currents of air in circulation, and employing well-trained servants as hewers and overlookers, that we may ascribe the freedom from accident which has characterised the working of mines of late years in the Northern Counties. The Springwell Mine, as it is extended to the dip produces gas more freely. Under certain conditions, as we have shown, the coal could not in practice be worked; by a combination of skilful arrangements this, however, is now done in a great measure with security. The temperature at the extreme east workings is uniformly 70°, the depth below the surface is here 200 fms.; assuming the invariable temperature to be 50° at 50 feet, and an increase of 1° for every 60 feet increased depth, the temperature, in accordance with this depth, would be 69°.

The Low Main seam is worked on the bord and pillar system; the coal is 3 ft. 4 in. in thickness, including 2 in. of splint in the middle, blue metal, good roof; fire-clay of inferior quality underneath. The pillars are made 32 by 22 yards; bords, 4 yards; walls, 2 yards; both whole and pillar working are in operation here. The Stephenson lamps are used exclusively in both. Powder is used in the whole workings only, and blasting is done by men specially appointed for this purpose. The seam itself produces little gas, but the mine is subject to irregular discharges of gas from the Hutton seam below, on the breaking up of the strata between the seams, more particularly where a barrier has been left in the latter. The main east road in the Low Main seam is driven over the Hutton engine bank, so that staples can be sunk to the latter as the workings of the Low Main are extended. The Maudlin seam lies 10 fms. above the Low Main seam. The section is:—

1.—Blue metal roof.	
2.—Good coal	2 ft. 8 in.
3.—Splint band, left in mine	0 10
4.—Good coal	1 6
5.—Shale band	0 1
6.—Good coal	0 1
7.—Fire-clay, not good.	0 6 5 ft. 7 in.

The pillars are made 30 by 22 yards; bords, 4 yards; walls, 2 yards in width; only whole working is yet in operation. No gas is perceptible in this mine; candles are used throughout. The workings are all on the rise side of the pit. The Maudlin coal is dropped down a staple to the Low Main seam, from thence it is conveyed by a self-acting incline, which lands near the pit. The gradient on this incline is 10 in. per yard; there are two lines, the incline-wheel is 7 ft. horizontal, the rope being crossed is brought over another wheel in front of 6 ft. diameter. The conveyance of coal in the Maudlin and Low Main seams is effected principally by horses and small ponies; engine-power is not yet introduced.

The safety-lamp used in these mines is the "Springwell Stephenson," the peculiarity of which is the perforations in the copper cap of the glass; there are in this lamp side perforations, as well as those at the top of the cap. In the last Hutton experiments, recorded in the *Mining Journal* of October, 1869, it was stated that the Springwell Stephenson lamp required, to cause explosion outside, a current of 48 ft. per second of inflammable gas. In the original Stephenson lamp there are no side perforations in the cap, and the greatest current of inflammable mixture did not cause explosion outside. The total air in circulation through the three mines is about 100,000 cubic feet per minute, of which 80,000 cubic feet ventilates the Low Main and Hutton seams, the agent being the Quarry upcast pit. And 20,000 cubic feet is sent through the Maudlin seam, the agent in this case being the Springwell upcast from the underground boilers and engines. The Hutton seam produces good gas coal; the Low Main produces steam coal; and the Maudlin seam household coal.

ACCIDENTS IN BLASTING—SAFETY-FUSES.

SIR,—Whenever accidents from blasting are reported it is almost invariably stated that they have resulted from the premature explosion of the charge, caused either by striking fire in tamping or by the fuse hanging fire longer than had been anticipated. If these be really the causes, why are not some of the remedies which have not only been proposed, but actually tested, and found to answer, been brought into general use? I allude especially to Copeland's waterproof cartridges, and firing by electricity. As to Copeland's cartridges, I know they are already largely used, but this has been principally in wet ground, by far too many of those connected with mining looking upon them as involving an unnecessary increase of expense. But in all safety appliances I believe any reasonable extra cost is unworthy of consideration, because if they save but a single accident yearly there would still be left a balance in favour of the safety appliance; this would apply in the case of blasting arrangements, as well as in that of safety-cages and strong ladders, for I believe that the effect produced in a mine by each accident is much more important than many suppose. It tends to increase the feeling that mining is a more dangerous occupation than it really is, and thus leads to a general increase in the cost of labour—an increase so small that it is of little advantage to the men, yet large enough to be of great disadvantage to the mine adventurers.

I have mentioned Copeland's cartridges in connection with the prevention of explosions in tamping, because I am sure there would be no difficulty in making them comparatively incombustible, as well as waterproof. The difference in the cost of blasting with the cases and without them is absolutely nothing, because the cost of the cases, which are now supplied unfilled, is made up for by less powder sufficing when they are used, and if they were treated with some chemical to prevent their catching fire with a spark I do not see how there could be any possible danger. There is always a great advantage, too, in using cartridges, because they facilitate carrying the fuse to the back of the charge, and when an electric fuse is used this would be particularly easy, as nothing whatever would pass through the charge excepting the conducting wire. The only expense that would be incurred in addition to that which has to be provided for at present would be for the small piece of insulated wire for connecting the charge with the main wire.

The great question with regard to the introduction of electricity for blasting purposes I consider to be the cost of the machine, and I cannot understand why the miner should not be provided with a small battery sufficient to give a spark at a distance of 100 yards for 7s. 6d. at most. In that case every pair of men could be provided

with the means of firing their shots—the owners of collieries find it no great hardship to provide safety-lamps, and at the prices mentioned electric machine could be quite as generally used. Whether magneto-electricity or frictional electricity would be the cheapest I do not know, but I should be inclined to give the preference to magneto, because the machines could be made smaller and more compact, and would thus be more likely to come into favour with the miners. As the material to be fired would have considerable bearing upon the strength of the battery that would be necessary, I should be glad to learn what material has been found most efficient for the fuses used in blasting, or what chemical substance was used in the Abel fuse and in the Abegg fuse. I believe both were the same in principle, but Abegg's were much more roughly and cheaply made. Fuses for general use by miners should not cost more than 2s. per dozen, and should not be liable to damage by being knocked about nor by damp. With a 7s. 6d. electric machine, and fuses at 2s. per dozen, the use of any system of blasting endangering the lives of workmen might be banished from the mines, and we should hear no more of accidents, either from tamping or from the premature or retarded ignition of a fuse.—*Dec. 26.*

MINER.

UNDERGROUND HAULAGE.

SIR,—The economy or otherwise of employing machinery for cutting coal appears to me to depend in a great measure upon the cost at which the motive-power is obtainable, and hence it has occurred to me that if the coal-cutting machines could be worked in connection with the hauling machinery by far the larger proportion of the difficulty would be removed. At first sight this may appear to be a very impracticable arrangement, but I believe that mature consideration will produce the opposite opinion, for it would have at least two advantages—the source of power could be conveniently placed, and the construction of the coal-cutting machine itself. But even assuming the cost of the machine to remain as at present, there would still remain an economy. The use of steam at the face of the work is, of course, out of the question, and the cost of conveying compressed air is very large, yet of these two powers we are compelled to choose the compressed air. But the question is, can we not have some power even cheaper, and more convenient than compressed air?

Rope traction in mines has proved to be economic wherever it has been judiciously introduced, and it is not improbable that by providing for the use of surplus power it could be much more extensively adopted. I should be inclined to give the preference to the endless rope system—indeed, I believe it is the only system applicable to the purpose—and the principle I would work upon is this. The ropes should be put down precisely as for haulage, but at the ends farther from the motive-power a double clip-pulley should be used, in order to permit of a supplementary rope to lead to the coal-cutting machine. Now, in most places the hauling is not absolutely continuous, and in all cases the coal-cutting machine requires to be worked at irregular intervals only. It would, therefore, not be difficult to use the one power alternately for hauling and for hewing. The hauling would, of course, be kept running continuously, and would pass through one-half of the double clip-pulley already mentioned. By means of a clutch box the second portion of the clip-pulley would be put in gear when required, for the purpose of transmitting motion to the machine. In the case of machines which make a rotary cut, almost every crank and lever could be dispensed with, and even in the case of pick machines the conversion of the rotary into reciprocating motion would offer no serious obstacle to the adoption of the arrangement. It will occur to anyone that the only other difficulty to be overcome is to permit the forward movement of the machine as the coal is cut. The mode of meeting this difficulty is obvious—any simple differential arrangement would amply answer the purpose. With regard to cost, which I suggested need not be mentioned, I will just state that although the differential gearing would be an extra, it must be remembered that cylinders and valves, with all their connections, are altogether dispensed with. Perhaps some of your correspondents would express their views upon this subject.

Dec. 27.

COLLIER.

THE FOREST OF WYRE COAL FIELD.

SIR,—I am much gratified to find, by a communication in the Supplement to last week's *Journal*, that Mr. Beckett, F.G.S., approves of my papers on the Forest of Wyre Coal Field, as his experience in that district is great, and his geological knowledge is admitted on all hands. I quite agree with him, that the Forest of Wyre has been the scene of a vast denudation of the older coal measures, which has left only here and there a patch of them to prove that they once existed, the vacancy being filled up by the younger coal formation, with its spirorbis limestone and poor sulphur coals. I cannot, however, agree with him, that this denudation, which extended further north, and caused the locally-called Symon fault, was there in a "narrow shape," or "mere branch," or that the denudation known as the Symon fault "interfered to a comparatively trifling extent with the deep coal field." When we know that it is proved to have affected the Little Flint Coal—the lowest workable coal in the eastern portion of the Coalbrookdale field, and we know not yet whether it may not have extended deeper still—it will be obvious that the denuding action will have had a considerable lateral range, and the limit thereof has not yet been proved, so that no one can say it is trifling at present. I quite believe, with him, that much of the older coal measures remain intact beneath the New Red and Permian, but how much no one can say. All tests should be made from the Staffordshire side, where the last symptoms of the coal measures are due to a dislocation, and not denudation. All the proofs so far to the east of the Forest of Wyre have only shown that thick deposits of the younger coal measures lie there, except in the case of the deep pit at Shatterford, the lowest parts of which may possibly be equivalents of the older measures. I shall advert to this subject in my papers on the Forest of Wyre Coal Field.

Mr. Beckett proposes a trial further west of Compton; this is probably a misprint for east, as appears from what follows. If the denudation has not gone so far east as Enville, where he proposes a trial, I have no hesitation in saying that the older coal measures, of the same character as those found at the Lye, would be met with. There is no doubt that a patch of the older measures occurring at Harcott can be correlated with the Cleo Hill and the Coalbrookdale coal fields, but what I should much like to see is an attempt to correlate the Upper measures of the Forest of Wyre with the Upper measures which are so well developed in the southern portion of the South Staffordshire coal field. This might be satisfactorily done, if only they could find the spirorbis limestone there. Now, Mr. Beckett tells me that he remembers very many years ago having seen a thin limestone taken out of a shaft in that southern district, and I am quite hopeful that when its geological importance is understood all future sinkings will be most carefully watched, in order to discover it. It has been my guide in the Forest of Wyre, and will be a guide in the southern portion of South Staffordshire. If Mr. Beckett would record what he can remember relating to it, it would be a stepping stone. I am especially glad to have the opportunity of comparing notes with fellow-workers in the same branch of study, through the medium of your columns.—*Shifnal, Dec. 26.*

DANIEL JONES.

TECHNICAL EDUCATION—THE NATIONAL UNIVERSITY.

SIR,—A few years since certain members of the Jewish community promoted a scheme for the establishment of a hospital exclusively for poor Jews, the locality chosen being the east end of London, not far from the London Hospital, wherein there are wards specially set apart for Jewish patients, and so carefully watched over that Judaism was as safe from taint in them as it is in the house of the Chief Rabbi. The practical and business-like principles of the Jews enabled them at once to see the object of the enterprise, and although it would have created some excellent positions for some very amiable Jews who had obtained good positions at the universities, it failed to receive the support of the Jewish community, because it was seen at once that, although the contributions of the richer Jews enabled the London Hospital to provide abundant accommodation for the Jewish sick, there was neither the necessity, nor would there be available funds, to support a separate institution. The projected National University is open to all the objections that were urged against the projected Jews' Hospital.

The alleged object of the National University is to create an institution to control technical education throughout the land, and it is kindly proposed to take such establishments as the Royal School of Mines and, it may be presumed, the Dublin College of Science under its protection, and all the promoters require is that the necessity of the organisation should be sufficiently recognised by the public to secure the desired voluntary contributions by which the University is to be supported. In its object the enterprise is, no doubt, commendable, and I do not think a university supported by voluntary contributions would meet with so cool a reception as the Joint-Stock University of London obtained 30 or 40 years ago, yet both trouble and expense would have to be incurred to create the feeling in the public mind that a university ought to be an eleemosynary institution. But as the professed object of the National University is to facilitate the acquisition of technical knowledge by those to whom the science courses in the existing educational establishments are closed by the great expense incurred in attending them, and by whom, consequently, degrees from the present universities are unattainable, it would, no doubt, be more practical to offer the instruction than to certify its value after others have given it; for, as to the control that a young and voluntarily supported company could obtain, it would be so infinitesimally small that it may be disregarded.

Were the promoters of the National Technical University to turn their attention to the establishment instead of a National Technical College, they would have brilliant chances of success, because by applying the voluntary contributions (which could be obtained in considerable amounts from manufacturers and others) to the reward of merit, whether by prizes, scholarships, or otherwise, and especially by paying the examination fees, at (say) the University of London, such great inducements could be offered to students that the professors would always have sufficiently well attended classes to give them a fair remuneration.—*Dec. 26.*

T. R. A.

PEAT FUEL AND COAL COMPARED.

SIR,—This subject, which is of national import, has recently been renewed at the Society of Arts, on which occasion Mr. R. E. Alloway, M.A., attempted to prove that peat, patted or slapped on the palms of the hands, and then squeezed by hand-grips of boys and girls, produced an article of fuel 10 times more dense than when first dug; and that such fuel (hand made) was greatly superior to any other peat fuel that had been produced, or could be, by machinery and engines (however powerful). This was proving too much; and it was a pity that Mr. Alloway had not had his calculations of hand-peat working investigated before he stated that 10,000 drying-tables, 36 ft. long and 4 ft. wide, would be required for a peat-works of 100 acres (or 68 miles of tables), and that the bog could be continuously sunk or excavated for 40 to 50 years, on this 100 acres. And he evidently was under a wrong impression of the healthiness or intellectual employment of some thousands of boys and girls, seven months of the year, in picking up clots of peat, and squeezing into fuel. Surely this "horrid monotonous employ" in the bogs (as suggested or proposed by Mr. Alloway) could be better met by combining lively, spirited, bodily action, in digging, turning, and macerating the peat, and passing it into powerful machines, for drying and pressing the peat into balls or spheres, such as I have produced in balls, about 5 in. diameter, weighing above 50 per cent. more than coals of the same bulk (turned in a lathe), showing greatly increased density, stowing in much less space, and with great ease in loading into bunkers or furnaces, where they require no raking or stoking of fires, as the balls keep their circular forms in burning, lasting three times longer in consumption, or 1 ton of peat balls doing equal work, and generating as much steam in the same time, as 3 tons of best coal (as trial has proved), without smoke, smut, sulphur, or clinker.

These are facts which I submitted to the meeting at the Society of Arts, and I hope sincerely that I shall soon be placed in a position to enable me to produce not less than 50 tons of ball peat fuel per day, by working machinery and engines of great power, when abundant evidence will be everyday produced that facts prove themselves.

In conclusion, permit me, with the very best and kindest spirit, to offer a few remarks on the letter on "Peat Fuel and Coal," signed by "Erin," in the *Mining Journal* of Nov. 12. The writer says—"Peat fuel has never come into general favour (and, probably, never will)." This arises from wrong treatment of peat by wrong machinery, steaming, &c., and bad selection of fibrous peat or bogs, thoroughly unfit for fuel; and I am prepared to prove great superiority of peat charcoal for iron or steel manufacture to that of wood charcoal (that is, if properly prepared in peat charcoal retorts and ovens). Works are now awaiting practical commercial developments of peat charcoal as well as fuel, both of which have had ample fair trials, and only, with myself, await association of confidential men of business, who will show faith and trust in fair, honourable statements, by investing and increasing their capital.

W. AUSTIN, C.E.

13, South-terrace, Hatcham Park, New Cross, Dec. 27.

MINING ENTERPRISE—LIBERAL LANDLORDS.

SIR,—Mining is invariably a speculation, but, properly conducted, it is an honest pursuit. Judgment is absolutely of the utmost consequence in the selection of the ground in geological districts to invest capital in. There are barren and unproductive channels in the very best of our metalliferous localities; and in what are practically called lead channels, or bastard strata, lodes are productive more or less, as they pass through mineralised or unmineralised formations of ground. For example, copper is not found, as a rule, in Cornwall to exist in any great abundance more than three miles in clay-slate, locally termed killas, from the granite; except the so-called basins of killas as are traversed by porphyritic channels of strata, commonly called elvan courses—a species of granite without mica. Deep mines have no chance of competing with shallower new mines. New mines can be wrought at from 50 to 75 per cent. less cost than very deep mines, consequently a young mine returning 40,000l. a year may leave half that amount profit at the end of the year, and so in proportion. About 40 years ago Spain inundated Europe with lead ore, and sent down the price from 12l. 12s. to 6l. 15s. per ton, and ruined half the lead mines in Great Britain for a time, but the revolution in Spain put an end to these mines, and no capitalist dare speculate in that country to any extent since; but they are about to have a king in Spain, and with good laws Spain will doubtless become a rich country again. It behoves the owners of land in Great Britain to be on their guard, or as sure as that country gets into a safe and settled state enterprise in this country may be interfered with. Spain is a large and rich country in every respect, and so locally situated as to command the attention of enterprising men. I am informed that tin is found, as well as lead, in that country. I am told by a gentleman who has been several years in Mexico that he has found tin in abundance in that country also, over a space of 40 miles. Monopoly cannot exist in this country for any great period of time. The rent or royalty in future must decide the question. The first Marquis of Westminster realised his millions out of the Halkin Mountains, in Wales, whilst other lead owners, less liberal, got little or nothing. We are told by high authority that a liberal man devises liberal things, and by liberal things he shall stand.

A. BENNETT.

Dec. 27.

PACIFIC MINING COMPANY.

SIR,—The shareholders in this hitherto disappointing enterprise have solid grounds for hoping that, so far as the Lander Hill Mine is concerned, they may yet be the possessors of a permanently profitable property; while Union Hill, upon the ultimate value of which important light has recently been thrown by the development of contiguous properties, seems more than probable may yet prove to be all that was expected of it. If, as is the case, a practical authority, long familiar with the Nevada silver mines, and at present largely interested in the Eberhardt and Aurora Company, has expressed a most favourable opinion of the future of the Lander Hill Mine, if, indeed, he has not (by reason of the favourable view he entertains) actually consented to accept its management, there are certainly sufficiently encouraging phases to justify shareholders looking forward to the realisation of a success not calculated upon by those at present unaware of these facts, although, judging by the gradually improving market value of the shares, duly appreciated by those to whom they have been made known. Unlike mines in this country, it does not take many months to open up a really valuable property in Nevada, by reason of the great value of the mineral produced. This is exemplified in the case of the Eberhardt and Aurora Mines, and many others; therefore, shareholders should bear in mind the fact that, however poor and discouraging may be a mine like Lander Hill to-day, its intrinsic value may, in six months, largely exceed the entire capital of the company. Au-

other important feature is that there is, I understand, ample capital in hand to fully and thoroughly develop the mine, and it need only be a very moderate success (that is, for a Nevada silver mine) to quickly return handsome dividends, and at the same time supply the small amount of capital necessary to provide the Union Hill Gold Mine with the requisite additional machinery.

These and other matters will, no doubt, be duly considered by the recently-appointed committee, and will be fully referred to in their report to the shareholders. If the committee, or some of its members, do really possess information of a satisfactory character, it is obviously the duty of shareholders to disregard the many attempts that continue to be made to intimidate them into disposing of their interest, for in Pacific, as in most other mines prominently dealt in upon the market, the shares appear to be heavily "beared"—hence no effort, it would seem, whether honourable or otherwise, is spared to disparage the properties in the estimation of those who are known to be shareholders.

It is not for me to anticipate the report of the committee, but from what I know of the mines it cannot fail to be of an encouraging character—that is, if the information upon which it is based has been gained from reliable sources. As far as the directors are concerned, the only one thing for which they can possibly be blamed is for so summarily suspending operations at Union Hill. It is true a considerable monthly expenditure has been saved, and that an outlay of 7000l. or 8000l. would have had to be incurred in the purchase and erection of more powerful machinery, but surely in a mine of this character and extent—a mine that has proved itself by returns to be highly productive and prospectively valuable by important discoveries recently made in the surrounding properties—a mine by the very nature of its rock formation that must almost daily alter in value, at one time discouragingly poor, and at another encouragingly rich—surely, in such a mine there are ample elements to ensure its recuscitation, if only, as I have above indicated, out of a portion of the revenue from Lander Hill. In simple justice to the shareholders, I have considered it my duty to submit these few significant facts to their careful consideration, trusting they will receive that attention which I consider their importance demands.

As I am continually receiving information from the other side, I propose in future, with your permission, to take your columns the medium through which to communicate it to the shareholders in the Pacific Company.

Langham Hotel, Dec. 27.

A NEVADIAN.

THE FUTURE OF MINING IN SPAIN.

SIR,—In my last letter, which appeared in the Supplement to the Journal of Dec. 3, three words were omitted, in reference to the Rio Tinto Mines, belonging to the Spanish Government. The decree has passed the Cortes for disposing of them, and the Government engineers have already completed their valuation. "The Government has disposed of all its native sulphur mines, salt mines, the manufactures of saltpetre, and the copper mines of Rio Tinto" will soon follow. The manganese mines of this province are nearly at a standstill; prices are so low that the quantities on hand at the several mines are very limited, and if they do not rise many mines will be closed up and abandoned.

HENRY SEWELL.

Huelva, Spain, Dec. 8.

[For remainder of Original Correspondence see to-day's Journal.]

THE MANUFACTURE OF COPPER ON THE TYNE.

BY R. CALVERT CLAPHAM.

[Read before the Newcastle-upon-Tyne Chemical Society.]

The manufacture of copper, as now extensively carried on, has introduced a new industry in this district. Up to the year 1850 no copper was produced on the Tyne; in 1851 J. and W. Allen commenced soda-works at Wallsend, to work out Mr. Longmaid's patent, and they extracted as much copper as would produce 4 tons of sulphate of copper weekly; a few years later Mr. Gossage erected copper works at Willington, Mr. Russell at Walker, and Mr. Mease at Jarrow, to work up the poor copper ores then chiefly obtained from Cornish and Irish pyrites. The regulus, or precipitate, was sent to Swansea to be smelted for copper. H. L. Pattinson and Co. began to smelt copper ores obtained from burnt pyrites in 1858; the regulus also being sent to Wales. Up to this date the total copper regulus, &c., made on the Tyne would not represent more than 400 tons of copper annually.

In 1865 copper works were erected at Hebburn, to carry out the so-called Henderson process, for extracting copper by the wet method from ores obtained from Spanish pyrites. Since that date there has been a rapid increase of production in the older works, and recently others have been erected for a similar purpose by the Bede Metal Company, at Jarrow.

The total quantity of copper produced on the Tyne in 1869 was 4100 tons, and of this quantity about 280 tons consisted of sulphate of copper, and the value of the products was about 340,000l. This production has been greatly extended in the present year. From the facilities now at hand for the disposal of the burnt copper pyrites produced in the district, instead of sending them all the way to Swansea, and the cheap rate at which copper pyrites can be supplied, it appears pretty certain that this ore will soon take the place of non-cupreous ores. The total consumption of pyrites of all kinds in the United Kingdom for 1869 was nearly 400,000 tons, viz.:

Imported from Norway	.....	395,091
" Holland	.....	13,983
" Portugal	.....	140,805
" Spain	.....	99,648
" other parts	.....	2,420

Total	.....	319,947
Produced in Ireland	.....	56,291
" Cornwall and other parts	.....	19,658

And of this quantity 265,543 tons consisted of copper pyrites, viz.:

Imported from Norway	.....	25,000
" Portugal	.....	140,805
" Spain	.....	99,648

Total 265,453

Large as this importation is, it may be interesting to know that the importation of pyrites for this year will not be far short of 400,000 tons. The importance of this fact on the future development of the soda trade cannot be exaggerated, and, indeed, these manufactures (soda and copper) are every year becoming more dependent on each other. The erection of copper works in this district has already had a marvellous effect in increasing local importations, and, at the same time, reducing the cost of the sulphur to the soda-maker, the price having fallen 40 per cent. since 1865.

As the plan of manufacture generally conducted in the district is well known to most of the members, I need only briefly refer to it. The pyrites most suited for the purpose is obtained from Spain, and contains less silica and other impurities than most other pyrites.

In the first place, the sulphur is nearly all extracted by the soda-maker in producing his sulphuric acid; the ores are then sent to the copper works. At this stage the better kinds contain about 3 to 5 per cent. copper, 4 per cent. sulphur, 4 per cent. silica, small percentages of silver and lead, and the balance is peroxide of iron. It is mixed with a certain weight of common salt, the quantity depending on the percentage of sulphur left after burning. The whole is ground to a fine powder, and is then placed in long reverberatory furnaces, which are kept at a moderate heat. During this operation the sulphur is converted into sulphuric acid, and the salt is at the same time decomposed; the hydrochloric acid acts upon the copper, and provided the heat in the furnace is not kept too high, the whole of the copper is rendered soluble, and can be washed out of the residue. A part of the chloride of copper is, however, driven off by the heat, and passes off into the condensers along with the free hydrochloric acid, and is there condensed. The acid solutions from the towers is of a distinct greenish-blue colour, showing the presence of copper.

When the ground material in the furnace is complete it is thrown into wooden tanks, and digested in water and the acid solutions from the condensers, the acid assisting most materially in dissolving out the metals. The liquors run off from the tank are necessarily of a mixed nature, and consist of chlorides of copper, silver, and lead, and undecomposed common salt, also sulphates of soda and lead, &c.

To obtain the copper the liquors are treated with old scrap iron or spongy metallic iron, which is made from the residue ores, by heating with coal in a muffle furnace. In both cases the copper is precipitated, but when spongy iron is used the action is much more rapid. The precipitate thus obtained is frequently washed in water, to free it as much as possible from the salts of iron, soda, &c., after which it is allowed to drain and partially dry. In this state it is smelted in an ordinary reverberatory furnace, the first smelting yielding what is termed pimple copper. This is again slowly melted in a similar furnace, with a free current of air passing over it, for the purpose of oxidising the impurities. It is run out, and forms what is termed blister copper, which is refined into cake or ingot copper for the market.

The residue left in the tanks consists of nearly pure peroxide of

iron, and is extensively employed for fettling in puddling-furnaces and in blast-furnaces, in the place of hematite ores. The analysis may be roughly stated as under:—

Peroxide of iron	.....	90.00
Silica	.....	6.00
Water, &c.	.....	4.00 = 100.00

Most of the Spanish pyrites contain also notable quantities of both silver and lead, and, in some cases, gold; but until very recently no attempt has been made to separate these metals. M. F. Claudet has, however, patented a process to effect this object, which may be briefly described as under. The ore is treated as above described. The first two or three washings, M. Claudet states, contain the silver, the chloride of silver formed during the calcination being rendered soluble in the large excess of common salt which is used. The solutions to be treated for silver are run into large vats, where a soluble iodide is added to precipitate the silver. The precipitate thus collected is a mixture of iodide of silver and sulphate of lead, with salts of copper. The latter are dissolved out by weak acid, and the remaining precipitate is decomposed by metallic zinc, which reduces the iodide of silver. The zinc iodide which is formed is used to precipitate chloride of silver from other solutions. The precipitate also contains gold.

It will be seen from the above short statement that all the metals in the ores can be extracted and made commercially useful, and that the only article produced in any quantity, and not hitherto utilised by the process, is sulphate of soda. Experiments upon a large scale have already been carried out by Dr. Merz and Mr. Napier to recover it from the waste liquors, and it may reasonably be expected that in time it will also be obtained. But if we leave our own locality, and glance for a moment at the production of copper in the United Kingdom generally, we find that the native mines, which have been worked for centuries past, reached their maximum production in 1860—viz., 15,968 tons. As the importations from abroad increased, and the production of copper from burnt pyrites gradually assumed greater importance, the mining of native ores has been proportionately abandoned, and the weight raised in 1869 amounted to only 8291 tons, equal to a reduction of nearly 50 per cent. The following figures represent the production, importation, exportation, and consumption of copper in 1869:—

Copper made from native ores	.....	Tons 8291
Cornwall and Devon	.....	6794
Wales	.....	346
Isle of Man	.....	30
Ireland	.....	1022
Sundry precipitates	.....	99
Copper made from burnt pyrites	.....	Tons 7600
The Tyne	.....	4100
Lancashire and other places	.....	3500
Imports (consisting of ores, regulus, bars, rods, &c., calculated as pure copper)	.....	Tons 65,007
Total	.....	78,988
Chili	.....	42,000
Australia	.....	7,500
Cape of Good Hope, Norway, North America, and other places	.....	18,987
The exports of copper manufactured in England are	.....	Tons 42,569
ditto foreign copper	.....	12,309
Total	.....	54,878

THE CONSUMPTION OF COPPER IN ENGLAND WAS AS UNDER:—

1864	.....	Tons 20,120
1865	.....	26,514
1866	.....	28,326
Or an average of 24,388 tons annually.		
1867	.....	Tons 20,305
1868	.....	17,400
1869	.....	21,665

In conclusion, I have to thank the copper manufacturers for the prompt manner in which they have given me all the information required, and Mr. R. Hunt, F.R.S., for his kindness in overlooking my figures, and for valuable information.

FOREIGN MINING AND METALLURGY.

The information which comes to hand from the various centres of Belgian manufacturing and metallurgical industry exhibits the state of affairs in a tolerably favourable light. If the orders received for rails, plates, and iron have rather notably fallen off, on the other hand orders for pig-iron and castings arrive in greater numbers. Some establishments are suffering cruelly, however, from the effects of the crisis which weighs upon European industry. The Berg and Mark Railway Company has invited tenders for some rather important contracts for railway plant. These contracts comprise 500 coal trucks, 1000 open goods trucks, 200 trucks for the conveyance of rails, 100 covered trucks, and a large quantity of cast-steel axles, iron wheels with puddled steel tyres, cast steel wheels, &c. Belgian industrialists will endeavour to obtain a share of these contracts. The Thy-le-Chateau Blast Furnaces and Forges Company will pay, on Monday, interest upon its share capital for 1870.

The last few days, having regard to all the surrounding circumstances, have not been an unfavourable period for the Belgian coal trade. The deliveries made to Germany and Holland have been tolerably well sustained, and but for the want of rolling stock upon the railway lines Belgium would, probably, find in those countries important outlets, which would compensate her to some extent for the almost complete annihilation of the French demand. Coal for industrial purposes continues to be much sought after, small coal has been taken off as fast as it has been extracted, and coke has easily found purchasers. The increased cold which has prevailed of late has stimulated the demand for coal required for domestic purposes, and prices for these descriptions have been well maintained. Boatowners on the Sambre have been compelled to suspend their operations in consequence of recent rains. The stocks of coal accumulated on the banks of the canal from Mons to Condé on the 1st inst. amounted to 2,120,700 hectolitres, as compared with 1,264,800 hectolitres at the corresponding date of 1869. The Sara-Longchamps and Bouvy Collieries Company will pay 2l. per share on Monday as interest for 1870. The Bonne Esperance and Batterie Colliery Company will also pay on Monday its first dividend for 1870, or 1l. per share.

Scarcely any intelligence has come to hand this week as to the French copper markets. It is not surprising that the German copper markets remain extremely quiet—first, because current events sadly check business; and, secondly, because the present period of the year is not favourable to the development of large transactions. The price of copper is, nevertheless, firmly supported upon most of the German centres. At Hamburg the price of copper has hardened, although business remains in a comparatively languishing state. In Holland, also, there is no change. The German tin markets have followed the corresponding markets in England and Holland. At Berlin tin has been the subject of considerable transactions. At Rotterdam there has not been any great amount of business passing in tin; prices have been, however, pretty well maintained at 75s. to 76s. Billiton is scarce, and cannot be purchased at a cheaper rate than Banca. Advices from Batavia, under date Dec. 6, report a sale of 6000 piculs made by the Government at about 73s. On the German lead markets there is nothing very particular to notice. Stocks are limited, and prices are comparatively low, but there is no immediate prospect of a revival in affairs. At Rotterdam lead has remained without change in value. Zinc has been generally quiet. Both at Breslau and at Hamburg transactions have not been numerous; a fair amount of business has, nevertheless, been passing at the last-named centre.

THE BURRO MINES, NEW MEXICO.—These newly-discovered mines are situated in a chain of mountains between the Burro and Chiricahui ranges, in lat. 32, long. 108½. At first the locality was thought to be in Arizona, but it proves to be in New Mexico, about three miles from the projected line of the Southern Pacific Railroad. The place is 40 miles from Fort Brown, 80 miles from Mimbres, 100 miles from Pinos Altos, 120 miles from Mesilla, on the Rio Grande, 150 miles from El Paso, 650 miles from San Diego, and 800 miles from Sheridan station, from which freighting is done. The principal ledges of this district are apparently of immense width, from 20 to 100 ft., the massive croppings projecting hundreds of feet into the air—a solid body of argentiferous quartz that assays from 4 lbs. to 1000 lbs. per ton. There are millions of tons of this quartz in sight, only needing to be quarried out and crushed to produce millions of pounds. From a large number of assays made the average yield causes them to be regarded as very rich mines. One ledge or mass of this argentiferous reef has been located for a distance of about one mile.

This ledge is considered the mother lode of the country, and the district is believed by many to be the richest on the Continent, not excepting the famous Washoe district in Nevada. The large leads can be seen for a distance of 15 miles, so the great wonder is that they were not discovered before. It would be indeed wonderful if there were no obstacles in the way of the development of this rich section. There is but very little wood within 20 miles of the mines, and no water other than for drinking purposes within 25 miles. In order to crush the ore, therefore, it will have to be transported the distance to the Gila river, and for this purpose a railway will undoubtedly be constructed. A company has been formed in San Francisco with a capital stock of 6,000,000l., and they propose commencing the building of a railway very soon. To intensify this excitement, if possible, rich deposits of chloride ores, eclipsing those of White Pine, have been discovered very recently. The extent of the chloride deposit is said to be two square miles. The district has been named the Virginia district, in emulation of the Comstock, and two smart little towns, Ralston and Silver City, have already sprung up. The route to Ralston is via San Diego, on the Pacific Coast, or Denver, on the Kansas Pacific Railway. In either case considerable staging has to be done, and that through the Apache country. We had almost forgotten to say that this rich region is infested by the most irrepressible hostile savages in the territories. The mines referred to above show signs of having been worked long ago by Mexicans, and it is believed they were exterminated by the savages, only a few burros or jackasses escaping, from which the section received its name.

AUSTRALIAN MINES.

YUDANAMUTANA (Copper).—The directors have received advices from their superintendent, dated Adelaide, Nov. 9, and he states: "I note the acceptance by the board of my drafts upon them for 4000l., and I feel that the directors have done everything they can possibly do to place me in the position I have been seeking, and on my part I promise that nothing shall be left undone that energy, perseverance, and judgment can accomplish towards making the old mine pay, and pay well. The downlight shaft is being pushed on, and at date of Oct. 31 was down 7 fms. Wood is coming in plentifully, and I expect by next mail to be able to advise you of a closed contract for supplying our works for six months at 10s. for all dry wood. I also fully expect to be able to report a reduction in the price of carriage to and from the mine and Port Augusta of at least 15s. per ton. Feed is abundant here in consequence of the beautiful rains this season, and the fine harvest throughout the colony will I hope, sooner or later, tell upon the price of provisions, and enable us to effect further reductions in wages. The surveys for the railway north are going on rapidly. Our Government will shortly be in a position (which they have never been in before) to solicit for tenders, according to plans and specifications, Capt. Terrell reports under date of Oct. 31:—Blinnman Mine: Winze, south of No. 1 winze, 25 fm. level: The lode in this place is still holding good, we have had nine men working here nearly the whole of the month, and have broken some very good ore. The new engine-shaft is down 7 fms.; when we get down below the 10 fm. level, no doubt we shall cut some very good branches of ore. I will push on with this work, as until the shaft is down and pumping started we shall be unable to touch any of the splendid lodes at water level. Returns from Oct. 3 to Oct. 31: Ore raised and smelted 196 tons of ore, 19 tons 11 cwt. of copper, dispatched 21st, 7 cwt. 2 qrs.; stock of wood on hand 8th November, 2200 tons.

PORT PHILLIP AND COLONIAL (Gold).—Total gold obtained during the four weeks ending Oct. 12, 1870, or an average per ton, including pyrites gold, 6 dwts. 4½ grs. The receipts were 60107l.; payments, 34687l.; added to which was last month's balance of 473l., thereby making an available balance of 30201l. The amount divided between the two companies was 25000l., the Port Phillip Company's proportion of which amounts to 12500l. The balance of gold was carried forward to the next month's account. For the two weeks ending Oct. 26 the yield per ton, without pyrites gold, was 6 dwts. 12 grs. Remittance, 1400l.

ENGLISH AND AUSTRALIAN (Copper).—Port Adelaide, Nov. 9: The quantity of coals at Port Adelaide was 600 tons. There were one smelting furnace, two roasting furnaces, and one refinery furnace at work at the Port works. With reference to the wharf, the manager writes: "The wharf is now entirely occupied by vessels—the Yatala, Dana, and two coal ships, also the Crest of the Wave schooner at the stage berth; the spoon barges are still at work outside. The separating fence will be finished in a few days; the road has been completed some little time." There were about 160 tons fine copper ready for shipment.

AUSTRALIAN UNITED (Gold).—The directors have advices, dated Fryerstown, Nov. 7. Mr. Kitto writes: "At the Duke of Cornwall Mine a bath has been struck in the bottom level, causing the lode at the 200 feet drive to be drained. I have caused a winze to be commenced for communication between the levels, and will report the result by the next mail." Capt. Williams also reports as follows: "I beg to report on the progress of the mine for the past month. I stated in my last report that the lode in the 262 feet would, in all probability, be cut ere the departure of the last mail, provided we had a continuance of the same ground. We have struck a much thicker and harder sandstone bar than we anticipated, but I am glad to say we are through it in the upper part of the drive, and we have struck slate ground with leaders of quartz interstratified, thus lifting down the water from the bottom of the 200 ft. and enabling us to sink a winze on the lode in the 200 feet to communicate with the 262 feet level. We expect to strike the main lode in two or three weeks. Meanwhile we shall be driving through quartz country, which will probably yield good stone. We expect to raise sufficient stone from the winze at the 200 feet level to keep one battery going till the main lode is struck." With regard to the Central Mine, Mr. Kitto writes: "For some reason that I am unacquainted with, Capt. Angove's letter and report has not arrived. I may state, however, that our prospects at that mine are steadily improving, especially so during the last fortnight. Up to the present we have not reached the deep gutter, but hope to do so before the departure of the next mail. The gold we obtain from our present reef ground is of a character to lead me to suppose that it comes from a lode not far off. It is not at all water-worn, and is principally intermixed with quartz—its matrix—where 'gutter gold' is always smooth and very pure. Should we succeed in finding a rich quartz lode our prospects will be materially improved."

The following is an extract of letter received from Mr. Lamb, dated Nov. 7:—"The Central gold has enabled us to pay wages in part only. Had the additional capital written for come to hand, it is my belief that we should have been in the deep ground at the Central, resumed sinking at the Duke, and the company a success. With all drawbacks, however, there is yet some little improvement in our prospects. For the last week or so the yields have improved at the Central Mine. For the week ending Nov. 5 we got 40 ozs. of gold from about 200 tons of dirt; this is good paying stuff, and I hope this week's yield will be greater, as the latter part of last week only were we washing more than one machine daily. This dirt is from the old level, the gutter not being yet touched. The drive from the bottom of the winze is in under the west side of the gutter about 15 ft.; should this drive be sufficiently deep, of which there is little doubt, we shall have to commence another from the 'chamber' to join it. In the cross-cut, 262 ft. level, at the Duke, the men have got through the hard sandstone into slate, cutting a few leaders of quartz, thereby raising the level of the gutter, and that Mr. Kitto has been at work to have a winze commenced in the quartz, which proved payable at the 200 ft. level. In a few days we shall commence crushing some of this; while I write it is going into one of the passes."

ANGLO-AUSTRALIAN (Gold).—The directors have received the following advices from Australia. Capt. Raisbeck reports, under date Fryerstown, Nov. 7, 1870:—"I have the honour to report progress since the 10th ult.—Engine and Boiler House: The contractors have raised the walls of the building and stack to within 5 feet of the square of the roof, which portion will be completed this week (weather permitting).—No. 3 Engine-Shaft: The brace of this shaft has been raised 6 ft., puddled, and filled up ready for the 'poppel-head' and a winze nearly erected. We expect to commence drawing water from the shaft on Wednesday next."

SCOTTISH AUSTRALIAN.—The directors have advices from Sydney, dated Nov. 4, with reports from Lambton Colliery to Nov. 3. The sales of coal for the month of October amounted to 11,396 tons.

SCOTT BROTHERS' MINING ALMANAC.—Under this title a very useful sheet almanac has just been issued by Messrs. SCOTT BROTHERS, of Nutford Vale Works, Longsight, Manchester. Immediately opposite the Calendar matter are spaces for memoranda, and the Calendar is surrounded by tables, showing the value in English weights and measures of those in use in France, the breaking weights of ropes; the English weights and measures, in use and obsolete; the styles of English architecture; the density of gases as compared with atmospheric air; the English equivalents of foreign money; the comparative weight of round and flat wire and hemp ropes; weight of flat wire ropes; strength of materials, &c. There are also a good postal guide, and a table of stamps and taxes. The almanac is clearly printed and well arranged.

THE COLLIERY MANAGER'S POCKET-BOOK AND DIARY.—The second annual edition of this very useful pocket-book, almanac, and diary, has just been published by Mr. W. M. Hutchings, of Bouvierie-street, and contains an excellent diary, with pages for memoranda, a good calendar, and a large quantity of miscellaneous information of the exact character likely to be required by the class for whom it is intended, such as facts concerning ventilation, tables of the force and pressure of air, elasticity of atmospheres and steam, comparison of thermometric scales, comparison of the barometer and water-gauge, the produce of coal seams, specific gravity, weight of materials, &c. In addition to these there is an abundance of useful memoranda and tables, so that whilst offering all the advantages of a technical book of reference it fully serves the purpose of an ordinary pocket-book. All persons connected with collieries will find it a really useful companion.

FURNACES.—By the invention of Messrs. HOPKINSON, Huddersfield, the furnace-door is carried on hinges in the usual manner, and a large opening, or aperture, is formed in or about the middle thereof. In this opening is hinged a wing, valve, or plate, suitably formed to fit the opening when closed. This valve is connected by chain or other connection to a lever hinged intermediately on the door, and the other end of this lever is connected by a rod to a cup, float, or bucket capable of floating in or upon quicksilver contained in a suitable vessel; and this lever is also connected by a chain or other suitable means to the frame of the furnace, in such manner that when the said door is opened the wing, valve, or plate is opened thereby, and the cup, or bucket, is at the same time plunged into the quicksilver, by which, on the door being closed, the valve is held open for the admission of air to the furnace.

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